

Thesis title: High volatility, Thick tails and Extreme Value Theory in Value-at-Risk estimation

The case of liability insurance in Iran insurance company

Supervisor: Dr. Ghadir Mahdavi

Advisor: Dr. Kamran Nadri

Student: Zahra Majedi

**Abstract:** In the insurance industry, determining the appropriate amount of capital to hold in order to cover the unexpected future losses and also protect policyholders is very crucial. If the underlying optimal capital allocation. Providing a general -risk is not properly estimated, this may lead to a sub risk indicator such as VaR is essential for investors to manage the risk in a financial institution. In VaR estimation, we are more concern with using the methods which are focused on the tail behavior of the claims distribution. EVT is a powerful framework to study the tail behavior of a distribution.

We study the distribution of liability insurance claims of Iran insurance company in order to allocate capital adequacy level. In this study we investigate the application of extreme value theory for modeling the tail of daily liability insurance claims distribution. The performance of the extreme value theory in value-at-risk calculations is compared to the performances of adaptive and non-adaptive GPD, GARCH(1,1) and GARCH(1,1)-t, historical simulation and Var-Cov models.

Based on the findings of this research, we can observe asymmetric properties, fattailness and volatility clustering in claims distribution. The six models used in this study can be classified into two groups: one group consisting of GARCH(1,1) and GARCH(1,1)-t models which lead to highly volatile quantile forecasts, while the other group consisting of historical simulation, Var-Cov, adaptive GPD and non-adaptive GPD models provide more stable quantile forecasts. In the first group, GARCH(1,1)-t, while in the second group the GPD models and historical simulation are preferable for most quantiles.

**Key words:** Value-at-risk; Extreme value theory; GARCH model